A REPORT BY THE NATIONAL STEERING COMMITTEE FOR AERIAL APPLICATION OF PESTICIDES - WESTERN DEFOLIATORS

November 9, 1988

CONTENTS

I. INTRODUCTION

A. Committee Members

B. Committee Objective

C. Committee Procedures

D. Definitions

II. RECOMMENDATIONS

A. Field Experiment Testing

B. Pilot Project Testing

C. Other Recommendations

III. OBSERVATIONS

A. Administrative

B. Technical

IV. SUMMARY

APPENDIX

A. Meeting Agenda

B. Committee Members' Reports

C. List of B.t. Products

Note: Appendices A AND B will be added to hard copy of report and submitted with the other three steering committee reports.

I. INTRODUCTION

A. Committee Members

Gary Daterman, FIDR/PNW
Dennis Hamel, WO/FPM
Jim Linnane, R-3(RO)/FPM
John Neisess, R-5(RO)/FPM
Iral Ragenovich, R-6(RO)/FPM
Pat Shea, FIDR/PSW
Larry Stipe, R-1(RO)/FPM
Julie Weatherby, R-4 (Boise Field Office)/FPM
Jack Barry, WO/FPM (Davis), Committee Chair

B. Committee Objective

The meeting objective of the National Steering Committee for Aerial Application of Pesticides - Western Defoliators (the committee) was to review the need for, and to recommend field experiment and pilot project testing of aerially applied pesticides for control of western defoliators. The committee also took the opportunity to recommend administrative, procedural, and testing needs.

C. Committee Procedures

The initial meeting of the committee, as reported herein, was held at the Harbor Inn, West Sacramento, CA, October 4-5, 1988. This is one of four national steering committees that will meet and report on needs and recommendations for field experiments and pilot projects involving the aerial application of pesticides. Each committee will prepare and submit a report to the Chief. A consolidated summary report of the four committees also will be prepared after the fourth committee meeting in January, 1989.

The committee activities is one of several FPM and FIDR national activities. These include the Forest Health Initiative, FIDR activity review, FPM pesticide-use reviews, FPM reviews of MAG and Davis units, and three regional pesticide technology need forums. These activities and their resultant reports and action plans will provide information to a national committee with representatives from FIDR, FPM, TM, and TMR that will produce a charter and action plan for pesticide use management and coordination in the USDA Forest Service (FS).

Prior to the meeting each member was requested to prepare a written report that reflected both technical and non-technical needs within the member's work area. These reports, as submitted, are enclosed (Appendix B). The meeting began with each member presenting a narrative of the report, followed by a discussion. From these reports and discussions a series of recommendations, observations, and needs were formulated. They are presented in this report.

There was little attempt to suggest, except in a few cases, how management might address the recommendations, observations, and needs nor who should perform the work. The committee proceeded on guidance that the FS will pursue a scientific and economically sound approach for evaluating aerially applied pesticides to control western defoliators.

D. Definitions

These definitions were agreed to by the committee and do not necessarily conform to those stated in FSH 2109.11.

1. Cooperative Testing. Testing conducted jointly by FPM, FIDR and/or other staff units. Tests may combine objectives of field experiments and pilot tests.

2. Demonstration. A special project that demonstrates a technique or strategy in such a way as to gain acceptance and use.

3. Field Experiment. A research project considering several treatment variables.

4. Pesticides. (1) Any substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest, or (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

5. Pilot Project. A special project that usually considers only a single treatment, identified from field experiments, to determine the value of a new or improved material, technique, or strategy when used under operational conditions.

II. RECOMMENDATIONS[1].

A. Field Experiment Testing

1. Conduct field experiments of new strains of Bacillus thuringiensis (B.t.) against western spruce budworm as recommended by PNW (Project 4502).[2].

One and possibly other new "strains" of B.t. will be ready for field testing during the spring of 1989. These are not genetically engineered (DNA manipulated) strains, but rather bred strains referred to as transconjugal crosses. A strain, identified as Condor-OF (HD-269) and produced by Ecogen, has been evaluated in the laboratory by PNW, has an experimental use permit, and is ready for field testing. The committee places a high priority on field testing microbials that have demonstrated significantly improved efficacy in the laboratory.

---

1. Recommendations are listed by priority in descending order with number 1 being first priority for field experiment (II.A.) and pilot project testing (II.B.). Priorities were not assigned for Other Recommendations (II.C.).

2. A list of B.t. products is provided in Appendix C for reference and clarification.

2. Conduct field experiments of lower doses of DFTM virus (Biocontrol).

Laboratory results suggest that lower dosages DFTM virus may be effective and this needs to be evaluated in the field to determine the lower effective threshold. The committee feels that emphasis should be placed upon reducing costs through reducing dosages.

3. Conduct field experiments of Sandoz Crop Protection Corporation (Sandoz) product SAN 415 SC 32LV (NRD-12 strain, 32 BIU per gallon) against Douglas-fir tussock moth in California (DFTM) to obtain efficacy data.

SAN 415 is registered for spruce budworm and gypsy moth but not in California. It is formulated identically to Thuricide 32LV except it contains the NRD-12 strain instead of the HD-1 strain. John Neisess advised the committee that data would have to be collected in California for a California registration. SAN 415 has not been adequately field tested and the committee recommends field testing of SAN 415 against the Douglas-fir tussock moth. Since the committee met in October Sandoz advised the FS that Sandoz will not bid any of their products competitively on price alone. The committee feels this is an administrative issue beyond the scope of the committee. Sandoz prefers to provide SAN 415 for forestry over Thuricide 32LV and Thuricide 48LV, the former an NRD-12 strain, the latter two HD-1 strains. The main production product at the Sandoz, Wasco, CA facility is Javelin, an NRD-12 strain, for the agricultural market. It would be relatively easy for Sandoz to produce SAN 415 as it contains the same strain as Javelin. The committee discussed testing of Javelin and decided against testing as it is not formulated nor registered for forestry.

4. Conduct cooperative field tests of several dosages (0.5, 1, and 2 ounces per acre) of Dimilin against DFTM in California.

There is need to identify the lower effective dose range of Dimilin (diflubenzuron) against DFTM for economic and environmental reasons. The need to conduct tests in California parallels the need discussed in paragraph 3 above.

5. Pursue laboratory testing of new B.t. strains.

New strains of B.t. should be tested in the laboratory as they become available. Numerous strains are being developed by industry that may have significantly higher efficacy against western defoliators.

B. Pilot Project Testing

1. Conduct cooperative pilot test of the Sandoz B.t. product SAN 415 against western spruce budworm.

Recommendation is subject to review by the committee of NRD-12 strain performance data and to Sandoz's intent to market SAN 415 for forestry use. If data are supportive, the committee may recommend operational use in lieu of pilot testing. This will be discussed at a sub-committee meeting in Portland, OR on November 22, 1988.

2. Conduct a cooperative field and pilot test of the Novo BioKontrol, Novo Laboratories, Inc. (Novo) product Foray 48B against western spruce budworm.

Novo privately field tested Foray in Oregon during the spring of 1988. The committee feels that the data from this test is not adequate to support operational use; therefore, a combined cooperative (FPM and FIDR) field and pilot test should be conducted during the spring of 1989 testing application volume. The Foray test would test more than one variable.

3. Conduct mini-pilot tests (blocks 50 to 500 acres) of lower B.t. volumes (less than 43 oz/ac.) of established B.t. products.

Data from Maine and Canada suggest that volumes as low as 24 ounces per acre may be effective depending upon control objectives. Success during 1988 in Oregon with 42.7 ounces per acre further supports testing lower volumes. The B.t. manufacturers have been urging the FS to consider lower volumes citing successes against spruce budworm and improved formulations. Dipel 8L applied at 32 ounces per acre would be a likely candidate.

4. Conduct a pilot test to obtain registration data for one or more pesticides to control pandora moth in R-6.

Current pandora moth infestations in Oregon have potential for expanding and requiring control. There are no registered pesticides to control pandora moth. Orthene was demonstrated to be efficacious in Arizona, however, it is not registered.

C. Other Recommendations

1. Conduct a field project to demonstrate aerial mating disruption with pheromone to suppress western pine shoot borer damage in ponderosa pine plantation.

Research data supports demonstrating this suppression strategy in ponderosa pine.

2. Develop a method to identify key personnel for assignment to the Incident Command (IC) System, and include and train FPM personnel in IC System.

This topic has been discussed since 1976 and the committee recommends that an identification method be developed with no further delay. The committee understands that a system is being developed by WO.

3. Assign on pilot projects IC team an FPM person as incident commander or deputy incident commander, and designate project entomologist to report directly to incident commander.

The committee expresses its concerns that the IC System does not provide a safeguard for the scientific integrity of a project and recommends that a scientist be assigned in the upper command structure. Further the project entomologist should report directly to the upper command and not be subordinated to an operational section in the organization. This should be included in FSH 2109.11.

4. Establish a western center for pesticide application technology.

The FS should establish a western center for pesticide research and application technology. There is need to provide state-of-the-art technology to pesticide users to include evaluating application systems, obtaining input to models, and evaluating monitoring and sampling methods. It should be a FS managed center as experience has shown that FS needs would be dominated by non-forestry interests if other agencies were included as partners. The committee is available for consultation on this matter.

5. Pursue registration and experimental use permits (EUP) for pheromones and viruses.

The committee suggests that WO/FPM identify a specific contact to coordinate the pursuit of pesticide registration and EUP.

6. Involve FIDR scientists in initial planning of pilot tests.

FIDR scientist(s) should be involved early-on in planning pilot tests and when appropriate should be part of the pilot project team. This will provide critical FIDR input, support team play, and enhance communications.

7. Conduct field experiments and pilot projects jointly and cooperatively between FIDR and FPM and other staff units as appropriate.

There are several examples of FIDR and FPM cooperation. There are opportunities to pursue this more aggressively especially in the area of cooperative field experiments and pilot projects.

8. Maintain the traditional approach to field and pilot testing.

The committee supports the traditional approach to field and pilot testing pesticides, techniques, and strategies is sound and should be continued. A pilot test can be described as a scaled-up field experiment that tests the resilience of procedures developed during field tests. Emphasis in the future should be on tests that are well designed, economical, and cooperative.

9. Maintain this committee as an advisory panel, as a forum for communications, and as a source for input and review as appropriate to field projects.

The committee strongly supports the continuation of this committee as a means to promote communications, cooperation, and coordination.

10. Request WO/Engineering to provide technical assistance to evaluate, in conjunction with pilot tests, aircraft guidance and spray monitoring systems.

Technological advances in recent years make it possible to track and monitor spray aircraft in real time, to guide aircraft to spray blocks, to assist pilots in maintaining swaths, and to monitor and regulate flowrates. These systems have the potential of reducing aerial observation aircraft and otherwise increasing the efficiency of aerial application. Systems are available; however, they need to be

evaluated and engineering specifications developed, tailored to FS needs. MTDC has an on-going related project and they previously have assisted FPM on aircraft guidance. Engineering expertise is needed to preclude a costly hit and miss approach in packaging a system tailored to FS needs using existing technology.

11. Establish documented guidelines for conducting a statistically sound field experiment.

Pesticide manufacturers and state cooperators have conducted field experiments which may have not been statistically sound. The committee believes the FS should encourage others to "carry the burden" of field testing; however, test design should be comparable to that of FS field experiments. Pat Shea volunteered to develop guidelines, based upon a previously published paper, and do this in coordination with Gary Daterman and Mike McManus.

12. Publish results of the 1988 Meacham R-6 pilot project in an appropriate scientific journal.

The FS should provide incentives to encourage all FS scientists to publish in refereed journals. Important data generated by FPM such as the Meacham data should be shared with the scientific community. Working more closely with Research scientists in the future, sharing authorships, and rewarding FPM scientists for publishing might be considered by management.

13. Establish a consistent approach for the use of suppression techniques in western spruce budworm management in the western Regions. Specific issues are effectiveness of suppression programs and economic analysis procedures to determine the need for, and the benefits from such programs. An underlying issue is pesticide use in forest environments.

The FS needs a Service-wide western spruce budworm strategy that is consistent and defensible. The committee recognizes that due to geographic and economic reasons, western spruce budworm management differs from region to region; however, there should be a clear strategy bound by a common rationale. The public is entitled to know FS policy and strategy in managing western spruce budworm, and the policy should be clearly stated and consistently administered.

14. Evaluate current and potential aerial application strategies for management of western spruce budworm populations in high value areas (i.e. seed collection sites, plantations, recreation/scenic areas, and other high value timber stands). There is a need to examine old ways and to seek new approaches.

Long standing issues surrounding budworm management have been the longevity of pesticide treatments, particularly B.t. These are: (1) the entomological unit philosophy requiring the treatment of entire entomological units (specific topographic or political boundaries associated with an infestation) versus a targeted spraying strategy of treating only areas or stands where resource objectives are eminently and severely threatened by the pest (reinvasion, resurgence, and multi-treatment issues); and (2) do suppression programs contribute to meeting long-term and short-term resource

objectives (monitoring issues). Clear answers to these questions are seldom agreed upon by various parties in FPM, research, and interested publics.

15. Prepare a review publication of past field tests, pilot tests, and operational projects of pesticides that are currently available or may be available against western defoliators and update annually.

Such a reference would be helpful in the field project planning process and perhaps reduce duplication. Julie Weatherby agreed to develop an outline for this publication.

16. Accelerate training, use, and enhancement of computer based aerial spray models (FSCBG2 and AGDISP) in planning, conducting, and evaluating aerial spray projects.

Models provide a powerful tool to simulate field application. Model application with accurate input parameters can reduce the scope of costly field projects. They can be used more vigorously in developing aerial contract specifications and treatment strategies. Additionally they can be used during the field conduct to provide advice to the project leaders and during post-spray operations for project critiques. Personnel need to be trained on the models and the models need to be evaluated and enhanced as needed.

17. Establish source or sources for data on droplet evaporation and droplet atomization of tank mixes.

Data on droplet evaporation and atomization are critical inputs to the aerial spray models. The FS has no facility to obtain these data. A source needs to be identified and a protocol established to provide these data.

18. Fund pilot projects adequately and do not subordinate under operational projects.

Funds provided by WO for suppression and control projects should have side-boards to insure the funds are used for the intended, agreed-to purpose.

III. OBSERVATIONS

A. Administrative

1. Concern that forest supervisors do not follow FPM recommendations even though they are both scientifically and economically sound. It is recognized that the Forest Health Initiative may bring focus on the resolve of this problem.

2. Need for more thorough documentation of all field projects.

3. Need to insure availability of several pesticides for each major western defoliator for both biological and economic reasons.

4. Need a reference publication on spray equipment to supplement the Program WIND publication titled "Aerial Application Equipment."

5. Need to update FS Handbook 2109.11 as it relates to pilot testing and the IC system. Confusion exists on this subject. The handbook should include standards and guidelines for pilot projects. Dennis Hamel has begun this update.

6. Need a procedure to maintain communications with pesticide manufacturers to insure that managers have correct information and that scientists have updated data. Dennis Hamel will discuss this with Max Ollieu and Jim Space.

7. Need to maintain a vigilance against the treadmill of field testing every formulation variant of B.t. This is a resource drain and we need to look for low-cost and technically sound ways to obtain information and field data.

B. Technical

1. Need to look ahead to use of expert system technology for pest management including aerial application technology.

2. Need a source or sources to obtain spray technology data and information on items such as spray deposition, atomization, droplet spectra, spread factors, pesticide chemistry and physical properties, evaporation, etc. on an on-going basis. The committee recognizes that this need is being addressed, in part, by work units and the national pesticide application specialist at Davis but these current FS resources are inadequate both in staffing and funding. This technical observation relates in part to recommendation II.C.3.

3. Need to include spray deposit and/or other methods of sampling on all spray projects to quantitatively monitor quality of application.

4. Need to accelerate the technology transfer and use of pheromones as the FS may be losing benefits of an effective tool.

IV. SUMMARY

The National Steering Committee for Aerial Application of Pesticides - Western Defoliators reviewed the need and made recommendations for field experiments and pilot testing of pesticides. The scope of the committee naturally evolved to identifying other related recommendations and needs. The committee sees a need to maintain the committee as a forum for communications and consultation.

APPENDIX C

List of B.t. Products [1/]

Manufacturer	Formulation	Strain	Pests	Rate/Volume	Status
Novo	Foray 48 BIU/Gal	HD-1	GM SBW	1 1/3 - 3 1/3 pt/A	Field/Pilot test
Ecogen	Condor OF 64 BIU/Gal	HD-269 Trans-conjugal cross	SBW GM	1 qt/A	Field test
Abbott	Dipel 6L 48 BIU/Gal	HD-1	SBW	43 oz/A	Operational
Abbott	Dipel 6AF 48 BIU/Gal	HD-1	SBW GM DFTM	43 oz/A 1 1/3 - 3 1/3 pt/A 1 1/3 pt/A	Operational
Sandoz	Thuricide 32LV 32 BIU/Gal	HD-1	SBW GM DFTM	24-80 (eg. 64) oz/A 32-80 oz/A 16-32 oz/A	Operational
Sandoz	Thuricide 48LV 48 BIU/Gal	HD-1	SBW GM DFTM	16-53 (eg 43) oz/A 22-53 oz/A 11-22 oz/A	Operational
Sandoz	SAN 415 SC 32LV w/anti-evap 32 BIU/Gal	NRD-12	SBW GM	24-48 oz/A	Field/12 BIU Pilot/16 BIU

1/ Information compiled by Dennis Hamel - October, 1988.